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**GROWING BERMUDA ONION SEED IN THE SOUTH-
WESTERN UNITED STATES.**By S. C. MASON, *Arboriculturist*.

THE BERMUDA ONION INDUSTRY.

Since the Bermuda onion has become established in the Southwest its acreage has fluctuated considerably, but in the Monthly Crop Report of the Department of Agriculture for March, 1917, the crop was estimated at 12,050 acres for Texas. To this estimate may be added possibly 1,000 acres for the Coachella and Imperial Valleys of southern California. A considerable area in southern Arizona is equally well adapted to the growth of the Bermuda onion, but thus far only a few acres have been planted to this crop. As the greater part of the acreage is hand transplanted from seed beds the quantity of seed per acre required is much less than where the onions are grown by thinning the field rows as planted. A seed bed of one acre sown with 25 or 30 pounds of seed will furnish plants for setting 8 to 10 acres in field order, thus requiring from $2\frac{1}{2}$ to 3 pounds of seed to the acre. Direct drilling requires 4 to 6 pounds of seed to the acre. At an average of 4 pounds of seed to the acre the approximate area of 13,000 acres would call for 52,000 pounds of seed, but as the acreage reports do not take note of patches of less than 1 acre, the small sales will add considerably to the annual demand for Bermuda onion seed in the United States. Commerce Reports, Washington, February 26, 1917, states that 74,987 pounds of onion seed, valued at \$83,132, were invoiced at the American consulate at Teneriffe, Canary Islands, for the United States during 1916, compared with 39,654 pounds, valued at \$40,828, for 1915. The retail price in ordinary years has been from \$2 to \$2.50 per pound, but in years of scarcity the price has reached \$4 or even \$6 per pound. Bulletin 46 of the Texas Department of Agriculture states

that Yellow Bermuda onion seed in quantities has been obtained by South Texas growers at \$1.25 to \$1.50 per pound. Until recently the greater portion of this seed has been imported from the Island of Teneriffe of the Canary group.¹

SUMMER STORAGE OF BERMUDA ONIONS.

As the Texas and California grown Bermuda onions are harvested in April and May it has been difficult to keep seed stock until planting time in the fall, and until recently little attempt has been made to grow this seed in the United States, owing mainly to a lack of understanding of the conditions necessary for the successful storage of these onions.

In a confined atmosphere with considerable humidity, onions will decay rapidly and in a cooler humid atmosphere soon start sprouting. As an example, at Sacaton, Ariz., a quantity of selected Ber-

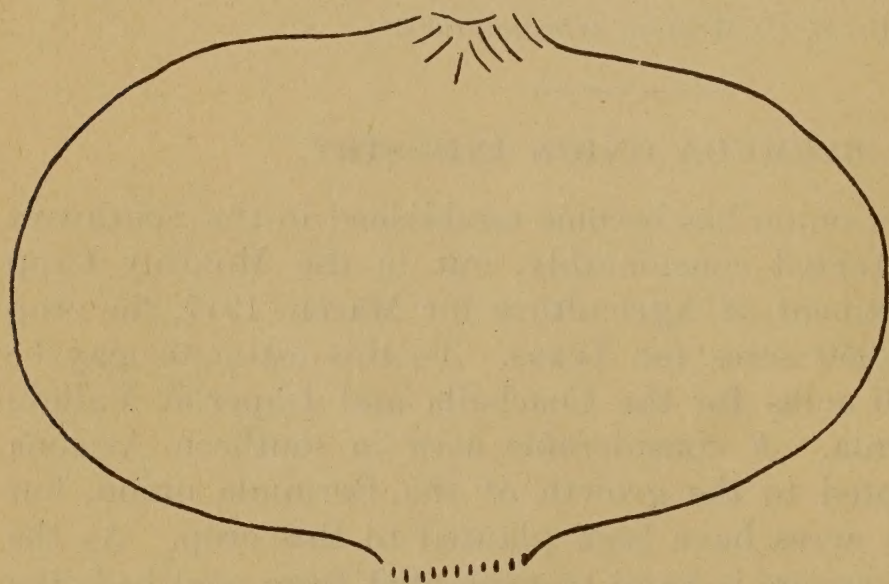


FIG. 1.—Outline of a Yellow Bermuda onion, showing the correct type of bulb to select for seed growing. Diameter, 3 inches; weight, 4.95 ounces.

muda onions in crates was stored in a close adobe warehouse in June. In a few weeks the combination of heat and moisture from the onions themselves had caused the decay of nearly the entire lot. Of the onions of the same plat left in the ground till

September 1 the loss was only about 10 per cent. Others spread on lath trays in an open, airy shed deteriorated very little.

In Dongola Province, in Sudan, onions harvested in May may be found perfectly hard and firm in September. The Dongola region is one of the hottest in Africa, the mean of the monthly temperature from May to September being 88° to 92° F., but the mean relative humidity is the lowest in Sudan, ranging from 12 per cent in May to 30 per cent in August and 22 per cent in September. This low humidity record accounts for the perfect keeping of these onions

¹ Attempts have been made to grow Bermuda onion seed in the Laredo district of Texas, and in some seasons the results have been excellent. As, however, the crop has not proved reliable one year with another, the effort to grow seed commercially in Texas has been abandoned. Considerable quantities of seed are now grown annually in California, and it is reliably estimated that from one-fifth to one-fourth of the demand for 1917 may be supplied by California-grown seed. So, as far as quantity is concerned, Bermuda onion-seed production may be considered as having passed the experimental stage.

in spite of the intense heat. The native gardeners stated that they were stored on wicker or slatted racks under open sheds which allowed a free circulation of air, and emphasis was laid on the fact that "there must not be one onion upon another."

It was largely due to the efforts of Mr. E. W. Hudson, while in charge of the Cooperative Testing Station at Sacaton, Ariz., that the production of Bermuda onion seed at Sacaton was brought to its present status. Onion growers in the Coachella Valley in California began experimenting in growing Bermuda seed at about the same time, and at present considerable Bermuda onion seed is commercially produced in that State. It was proved that a quality of Bermuda onion seed equal to the best imported from Teneriffe could be produced at Sacaton. By quality is meant not only the weight and vitality of the seed, but the quality of onions produced from it as demonstrated by field planting. The heaviest sample of imported

Bermuda seed purchased from a reliable seed house gave a count of 1,465 seeds to 5 grams; the second count gave 1,505 seeds; average 1,485. The selected stock of Sacaton-grown seed showed 1,460 seeds in a 5-gram sample. Stock that had not received quite enough water

in maturing showed 1,533 to 1,566 seeds in the 5-gram sample. Germination tests revealed practically no difference between the imported and the home-grown seed.

In the form and evenness of the onions produced it was demonstrated that from seed grown at Sacaton from carefully selected mother bulbs the resulting field crop was decidedly superior to that obtained from the common run of imported Bermuda seed. This feature of the home growing of Bermuda seed should commend itself especially to southwestern onion growers.

SELECTION OF MOTHER OR SEED-STOCK BULBS.

As the Yellow Bermuda onion is grown largely in the Southwest, these notes are applied to this variety exclusively. Onions from

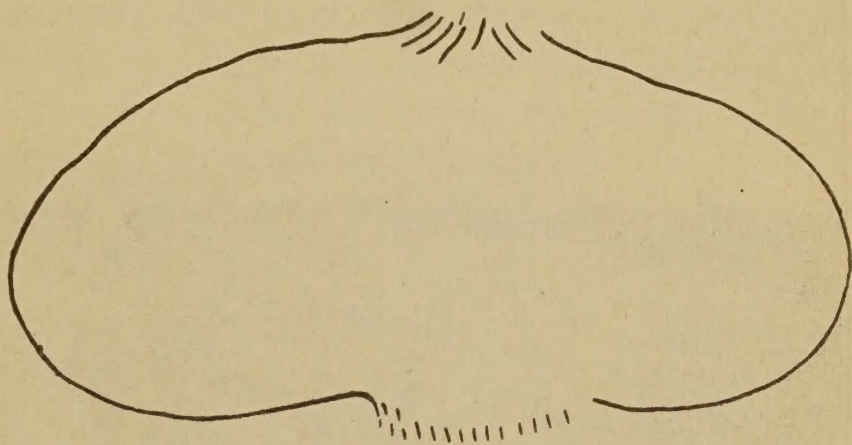


FIG. 2.—Outline of a Yellow Bermuda onion, showing the type of bulb which should be discarded in selecting for seed. Cupped or concave on the bottom; diameter, 3 inches; weight, only 3.65 ounces. With the same diameter, the bulb shown in this figure weighs 1.3 ounces (26 per cent) less than the better type of bulb shown in figure 1.

which seed is to be grown should be selected to conform to the following scale of characters:

(1) *Outline*.—The perimeter of the bulb should be nearly a perfect circle; all bulbs showing a tendency to lobing or asymmetry should be discarded.

(2) *Vertical section*.—The form shown by a vertical section should be lenticular, with rounded, obtuse margins (fig. 1), the upper surface slightly more convex than the lower. Any bulb with a cupped or concave upper or lower surface should be rejected. One result of careless selection of seed stock is the tendency to be thin at the center, sometimes both upper and lower surfaces being slightly cupped or concave (fig. 2). An opposite tendency is to take an oblate form, with a depth too great at the center.

(3) *Smoothness*.—A smooth, even surface, free from ribs or lumpiness is indicative of the best texture and should be required.

(4) *Firmness*.—With conditions of growth practically uniform, bulbs showing the most firm, solid texture should be given preference.

(5) *Single heart*.—The ideal bulb has a single heart or axis as distinct from several hearts as found in the “multiplier” or “potato” type of onion, but

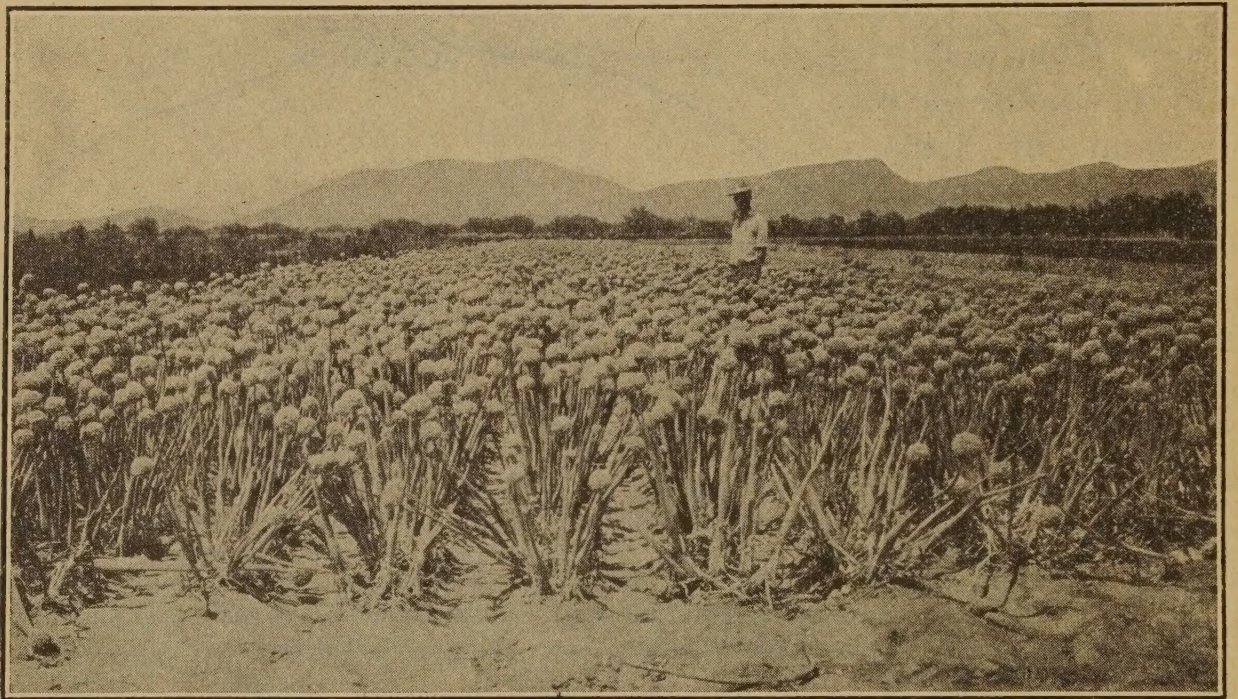


FIG. 3.—A field of Yellow Bermuda onions grown for seed at the Cooperative Testing Station, Sacaton, Ariz., May, 1914.

even in the best strains secondary hearts or “cloves” occasionally appear at the side of the main axis, and such bulbs should be rejected in selecting seed stock.

(6) *Color*.—Three distinct varieties or strains of the Bermuda onion are recognized, the white or Crystal Wax, the Yellow Bermuda, and the Red Bermuda, the last named being a pale color rather than a pronounced red. The Red Bermuda variety is in little demand, though quoted by some seed dealers. The Yellow Bermuda, sometimes quoted as White Bermuda, is now of chief commercial importance. The Crystal Wax, or Crystal White Wax of some seed catalogues, is a pure white strain of more delicate texture than the Yellow Bermuda and of growing popularity. Without great care in selecting seed stock, bulbs of an off color of red are likely to appear among the yellow and in some lots will amount to 25 per cent of the crop. The outer coat of the true Yellow Bermuda is a pale straw color, and the seed stock should be selected rigidly to that tint, rejecting any with the least reddish or violet tint.

SETTING AND CULTURE.

The stock onions should be set late in October or in November in a rich, well-prepared bed leveled so that it can be irrigated evenly throughout. Low ridges $2\frac{1}{2}$ feet from center to center should be prepared and the mother onions set along the center of these, 18 or 20 inches apart. Only light irrigation is needed in the fall; but in the spring, as soon as cold weather is over, the onions should be irrigated freely and the soil put in loose, mellow condition as soon as it is workable after each irrigation. Figure 3 shows a plat of these onions at Sacaton, Ariz., May 27, 1914. The yield of cleaned seed from this plat of 0.21 of an acre was 214 pounds, or at the rate of slightly more than 1,000 pounds to the acre; but in 1913 at this station a few square rods yielded at the rate of 1,200 or 1,300 pounds to the acre, and equally good returns were obtained on a small plat of Crystal Wax. A yield of Yellow Bermuda seed approximating that of 1914 was obtained in 1915, but data as to the precise acre yield are lacking. These yields have been obtained under intensive cultivation and from land well enriched and in a high condition of fertility.

HARVESTING THE SEED.

The seed heads have been cut with sheep shears and gathered into baskets, from which they were transferred to canvas sheets. The entire acreage hardly would justify the adaptation of machinery to this harvest. The climate of Arizona in June usually is so dry that little difficulty is found in curing the heads in airy, open lofts. With the small area so far handled, the dried seed has been pounded out and cleaned with an ordinary grain fanning mill. With a large area a clover-hulling machine doubtless could be adapted to this work.

CONCLUSIONS.

When it is considered that with the yields obtained 60 or 75 acres probably would supply the entire demand for this variety of onion seed in the United States, or that at yields of 500 pounds to the acre only 150 acres of seed bulbs would be needed, it will be seen that there is no great inducement to rush into this industry.

There seems to be no reason why all the American demand should not be supplied with home-grown seed, but such production should not be undertaken outside of limited areas in southern Arizona and California having the requisite mild winter temperature and dry air of the summer season. The production of this limited acreage of seed is in itself a small item compared with the gain to the growers in the improved yield and quality of the resulting crop of onions.

The 26 per cent better weight in the type onion over the thin, cupped one, as shown in figures 1 and 2, is typical of the improved quality of the crop produced. The quality of the onions grown at Sacaton from the second generation of selected seed stock was 25 to 40 per cent better than that of onions from Teneriffe seed grown on the same ground and under precisely the same treatment. The proportionate yield was still greater; but estimating an all-around gain of 25 per cent in the Bermuda onion crop of the United States, which for 1917 was nearly 3,000,000 crates, it will be seen that the incentive for the development of a home-grown seed industry lies chiefly in the rigid selection of seed-stock bulbs and goes far beyond the replacing of the volume of seed now imported.

Approved:

WM. A. TAYLOR,
Chief of Bureau.

AUGUST 13, 1917.

